

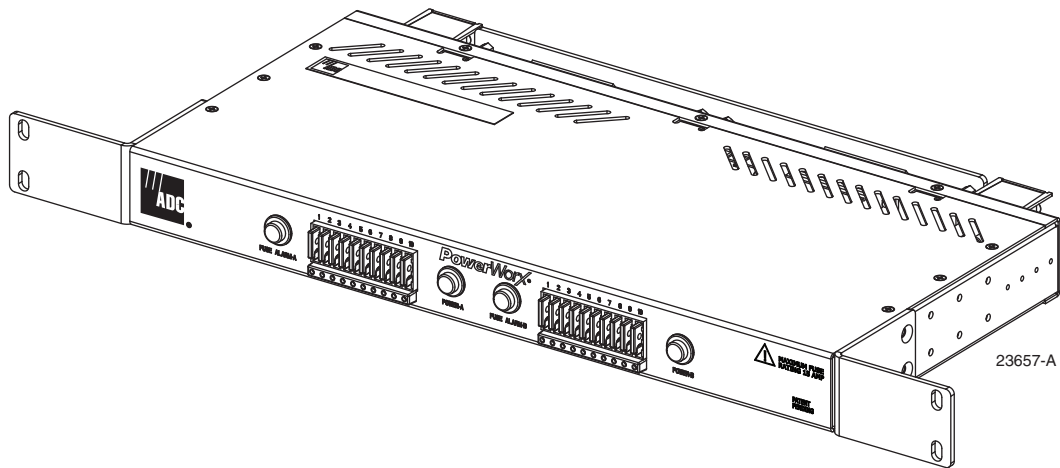


PowerWorx® Power Distribution Products

Traditional GMT Series Fuse Panel

User Manual

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REVISION HISTORY

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ABOUT THIS MANUAL

This user manual describes the PowerWorx Traditional GMT Series Fuse Panel, and provides all information required to install and operate this product. The GMT panel comes in a number of different configurations, all of which are covered in this manual.

► **Note:** In this manual, the product is referred to as “the GMT panel.”

The GMT panel is used to supply protected dc power to the equipment typically installed in a central office, multimedia headend, remote site, CEV, or other restricted access location requiring protected dc power.

STANDARDS CERTIFICATION

This panel meets UL, Telcordia (formerly Bellcore), NEC 1999, CSA, NEBS Level 3, IEC, and CE standards.

ADMONISHMENTS

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below), and are listed in descending order of severity of injury or damage and likelihood of occurrence.



Danger: *Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Warning: *Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Caution: *Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.*

GENERAL SAFETY PRECAUTIONS



Warning: *The fuse panel uses electrical voltage and current levels that may be considered an electrical hazard per GR-1089. Only qualified personnel should be allowed to install, operate, maintain, or otherwise come into contact with this equipment when energized. Only insulated tools should be used on energized elements of the panel.*



Warning: *Disconnect or turn off the power before connecting the fuse panel input or output wires. This may require turning off the system office battery input at the battery distribution fuse bay or removing fuses at the fuse panel.*



Caution: *Using the wrong fuse may cause damage to the protected equipment or the fuse panel. When replacing a fuse, make sure the replacement fuse rating does not exceed 15 Amps rating (10 Amps rating for panels with a maximum fuse rating of 10 Amps), and is the correct type and correct current rating as required by the protected equipment.*



Warning: *Wet conditions increase the potential for receiving an electrical shock when installing or using electrically-powered equipment. To prevent electrical shock, never install or use electrical equipment in a wet location or during a lightning storm.*

1 PRODUCT DESCRIPTION

The PowerWorx Traditional GMT Series Fuse Panel (hereafter called “the GMT panel”) provides GMT type fuse protection for telecommunications products used in central offices, multimedia headends, remote sites, and other locations requiring fused power.

1.1 General Description

The GMT panel is available in a number of different configurations, but all GMT panels have common features illustrated below in a front view ([Figure 1](#)) and rear view ([Figure 2](#)) of a typical panel. These features include:

- **Use of GMT fuses, as the product name implies**—The fuses may be arranged in either one or two strips providing 10, 20, or 40 fuse positions. Fuse rating may vary from 0.2 to 15 Amps. The GMT fuses are positioned in a user-friendly, upside-down orientation for enhanced fuse visibility when looking from below the panel (since the panel is usually installed in the top rack position).
- **Input amperage rating of 65 Amps per power bus**—Different models may have either one or two buses. Panels having two buses are rated for an input amperage of 130 Amps (65 Amps per bus).



Caution: See [Section 6.3 on page 28](#) for maximum bus loading condition.



Warning: Use of one bus only on a dual bus panel will result in false alarms for the unused bus. Power is required on both buses on a dual bus panel for normal operation.

- **Self-configuring voltage and polarity capabilities**—The GMT panel operates using an input voltage of ± 24 Vdc (with a range of ± 21 to ± 30 Vdc) or ± 48 Vdc (with a range of ± 42 to ± 56 Vdc). Output voltage is the same as the input voltage.
- **Ability to be mounted on either a 19-inch or 23-inch EIA or WECO rack**—All GMT panels are shipped with mounting brackets accommodating either selection. All GMT panels may also be mounted either flush or with a range of recess options.
- **High-brilliance, field replaceable LEDs**—These LEDs may be either of two types, a green power-on indicator or a red fuse alarm indicator. Most models have one of each type of indicator per power bus. One model has only a fuse alarm indicator. The indicators perform the obvious function of indicating when power is present or when a fuse is faulted causing a loss of power in any output of the bus.
- **Sturdy chassis design**—GMT panels are constructed of 16-gauge cold rolled steel. All panels come with a lifetime warranty. Panel color may be either putty or black.
- **Agency approval**—GMT panels are compliant with all major standards including UL, NEBS Level 3, Telcordia (Bellcore), NEC 1999, CSA, IEC, and CE, as indicated on the certification label on each chassis.

- **Sturdy input and output termination**—GMT panels provide secure, reliable physical connections for power input and output using two-hole compression lug or set screw barrel termination for input and screw-down or set screw termination for output.
- **Alarm connection**—GMT panels provide external fuse failure relay dry contacts for audio, visual, and remote alarms.
- **Fuse and voltage labels**—All GMT panels come with fuse value designation pin holders, fuse designation card and holder, and voltage designation label.
- **Two-post grounding**—All GMT panels provide two-post termination for chassis grounding. The lugs are spaced so that a two-hole compression lug can be used for termination of a larger wire (up to #2 AWG).
- **Protective covers**—All GMT panels have easily-removable, clear polycarbonate covers for input and output power terminations. These covers prevent against accidental contact with electric power.

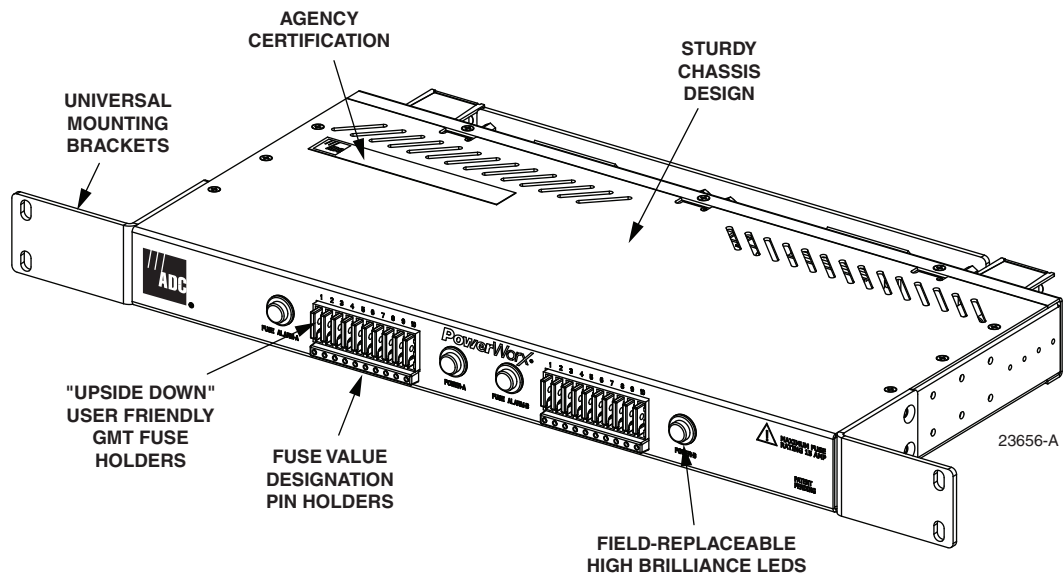


Figure 1. Typical GMT Panel (Front View)

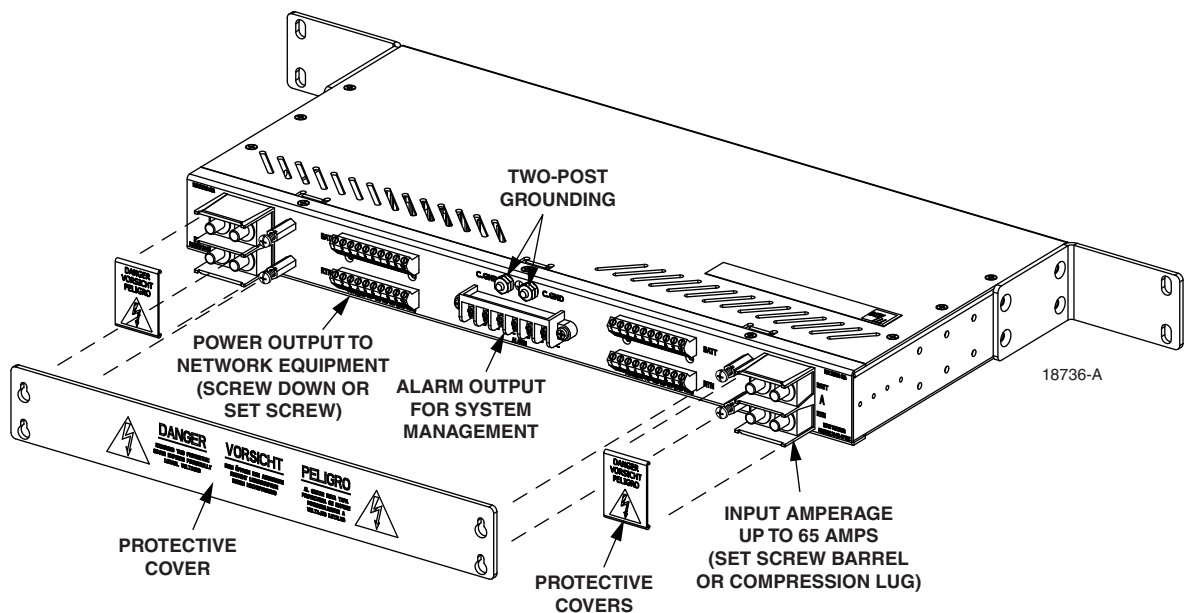


Figure 2. Typical GMT Panel (Rear View)

1.2 Product Options and Examples

The GMT fuse panel is available in various configurations with options as follows:

- Standard (front and rear) access or total front access.
- Single or dual power bus. Single bus options provide 10, 20, or 40 fuse positions. Dual bus options provide dual 10 or dual 20 fuse positions.
- Two types of input terminations: two-hole compression lug or set screw barrel.
- Two types of output terminations: screw-down barrier or set screw barrel.
- Two types of alarm terminations: screw-down barrier or wire-wrap pins.
- Various LED configurations from a single LED for both buses (as shown in [Figure 3](#)) to one power on LED and one fuse failure LED for each bus (as shown in [Figure 5](#)).
- Two chassis colors: putty or black.

[Figure 3](#) shows a front view of a dual bus GMT panel. Each bus provides ten fuse positions and ten outputs. This panel has a single fuse alarm indicator.

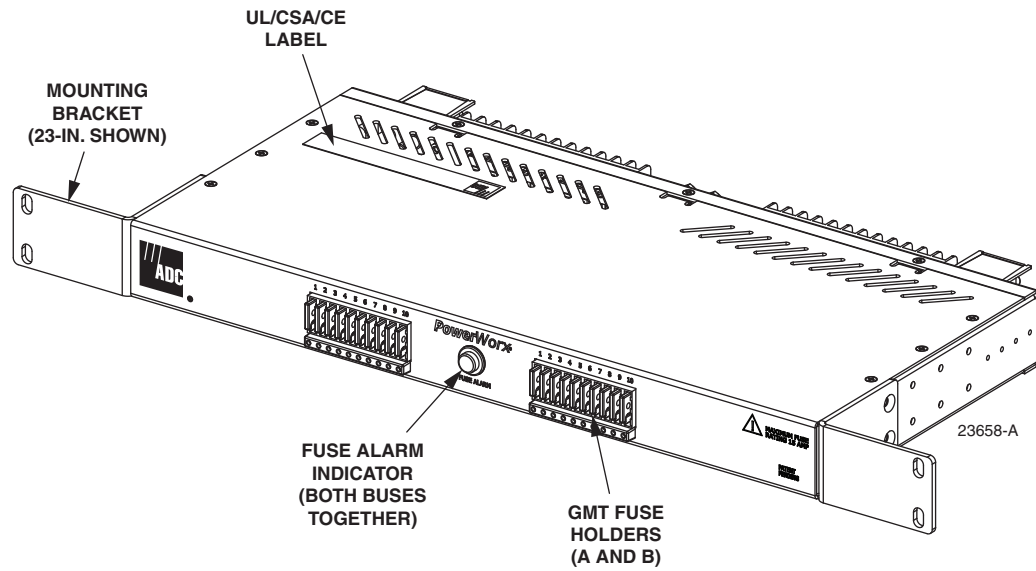


Figure 3. Dual Bus GMT Panel

Figure 4 shows a rear view of the same panel. This panel exemplifies several options including compression lug power inputs, screw-down power outputs, and screw-down alarm terminations. The figure also shows examples of the two-post grounding contacts and protective covers provided with all models.

Figure 5 shows a front view of the total front access panel. This panel also has dual 10-position power buses, compression lug power inputs, screw-down alarm terminations, two post grounding contacts, and protective covers. It has screw-down power output terminations.

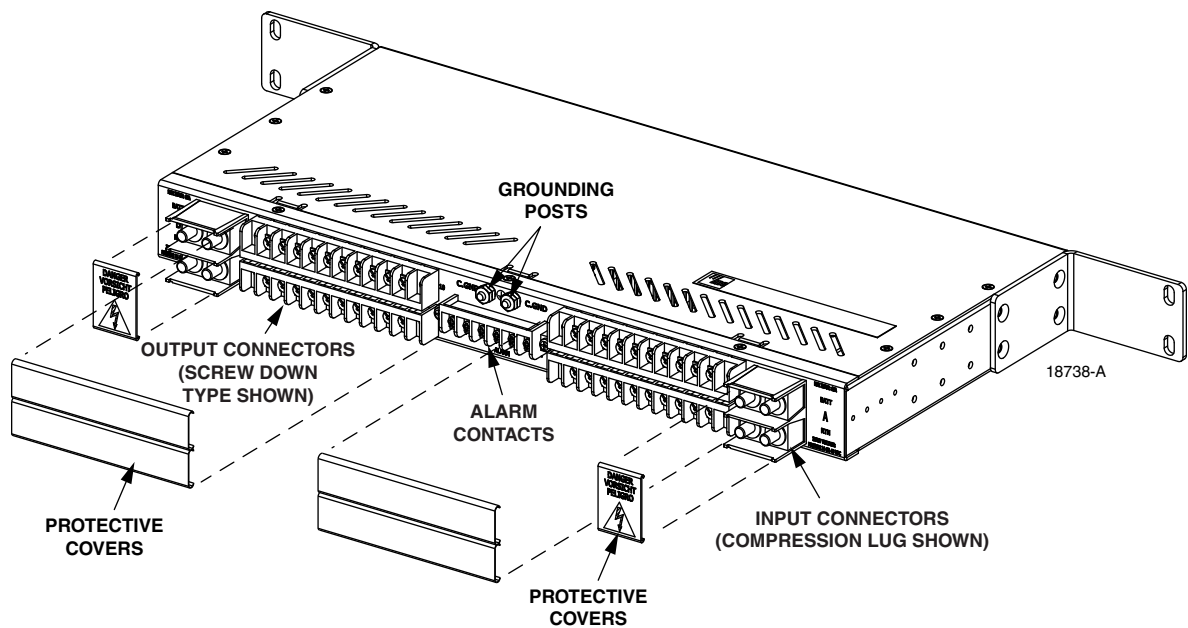


Figure 4. Rear View of Dual Bus Panel

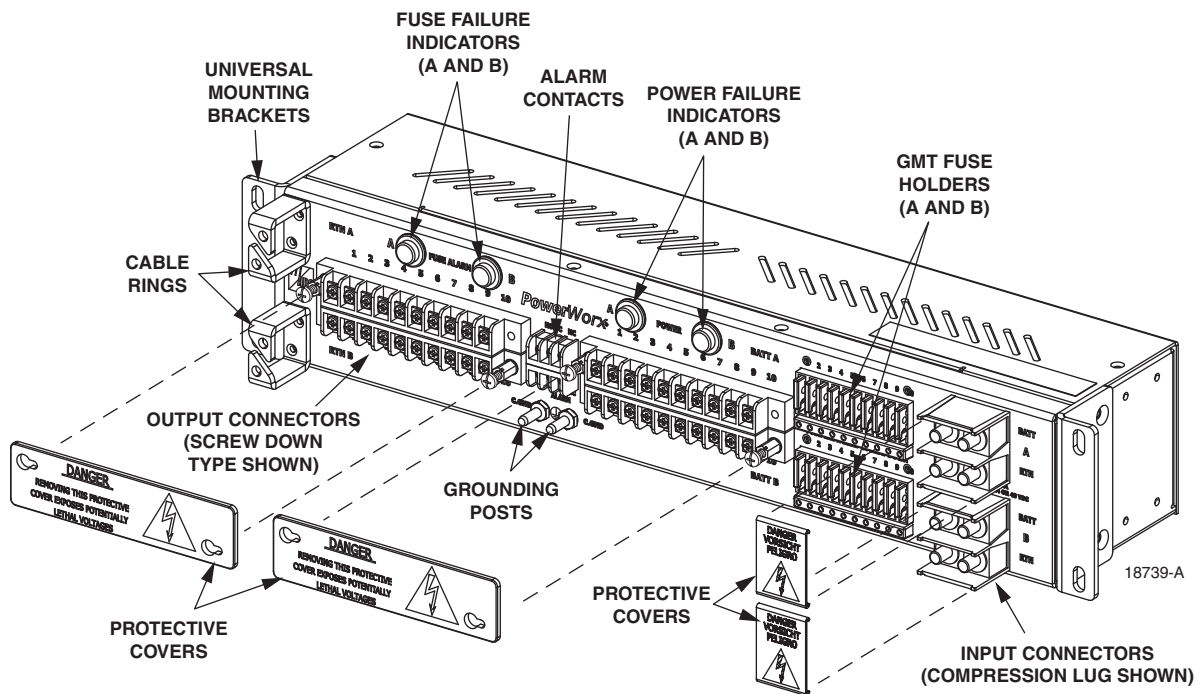


Figure 5. Total Front Access Panel

Figure 6 shows front and rear views of a single bus panel with ten fuse positions and two LEDs (power-on and fuse alarm). This panel illustrates the larger-size protective covers provided for panels having set screw barrel power input terminations. This panel is provided with a universal mounting bracket that can be used for either 19-inch or 23-inch rack mounting.

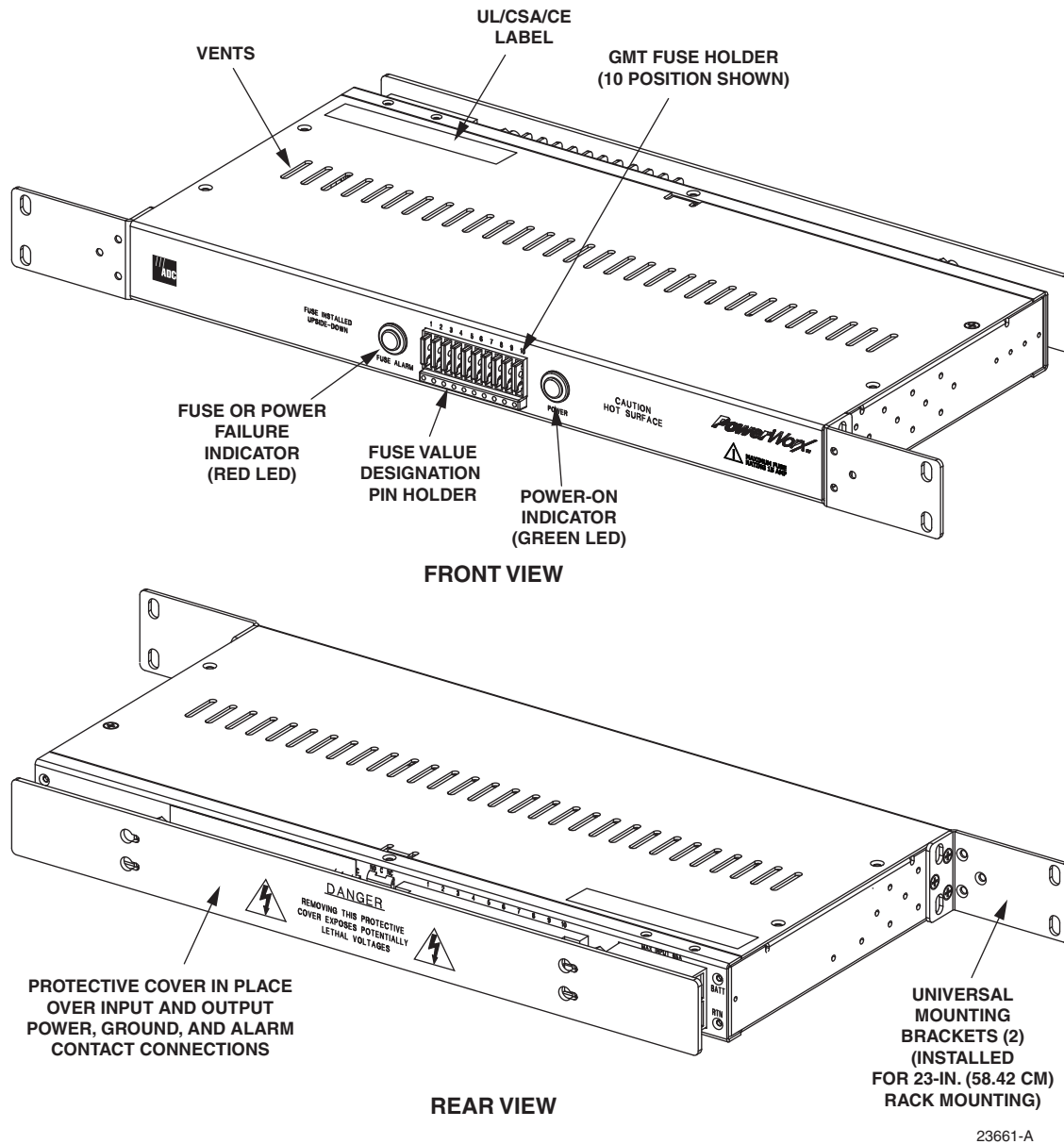


Figure 6. Single Bus GMT Panel

Figure 7 shows a panel with set screw barrel type input and output terminals.

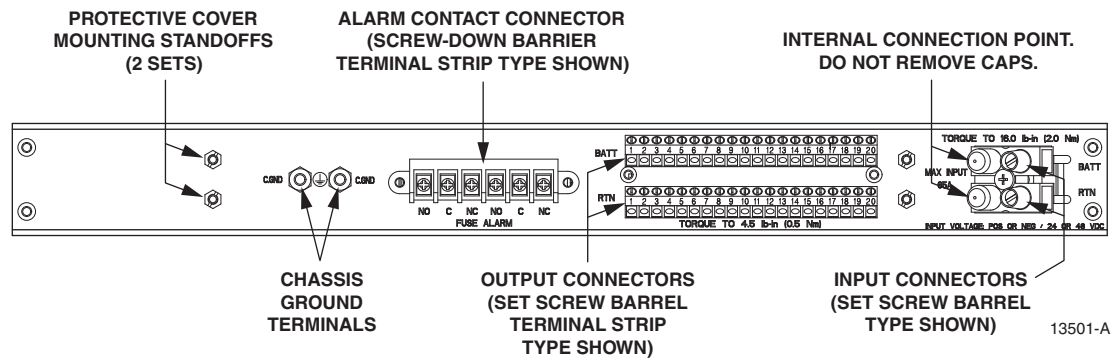


Figure 7. Panel With Set Screw Input and Output Terminals (Rear View)

1.3 Functional Description

Functionally, the central feature of any GMT panel is the power bus, which receives power from an external source, passes the power through an array of GMT fuses, and distributes the power to the connected equipment. Depending on the product model, a particular panel may have either one or two power buses. Figure 8 is a schematic of a dual power bus.



Warning: Use of one bus only on a dual bus panel will result in false alarms for the unused bus. Power is required on both buses on a dual bus panel for normal operation.

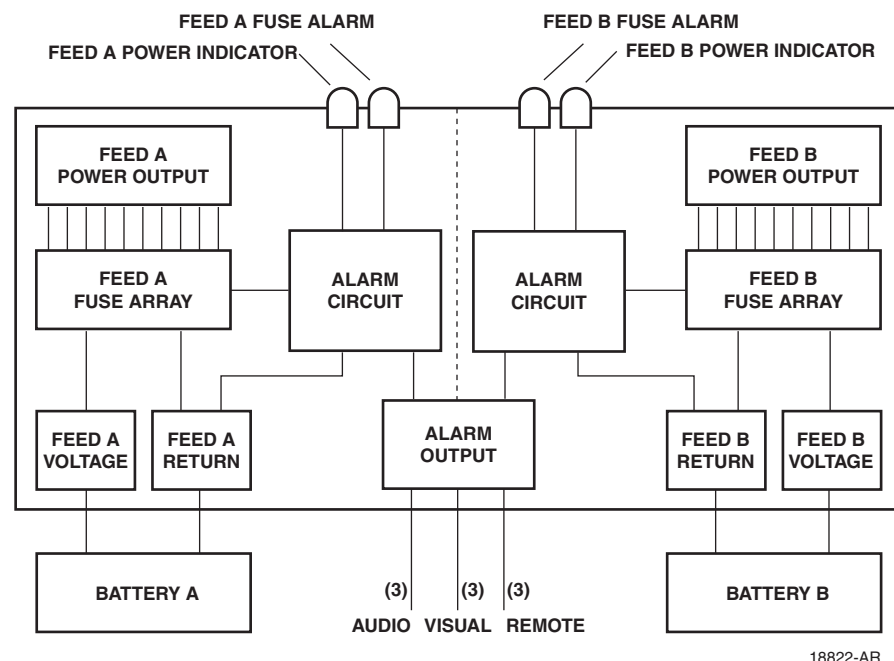


Figure 8. Fuse Panel Block Diagram

As shown, each bus has two input power connectors, labeled “BATT” (battery) and “RTN” (return). In each bus circuit, current flows from the input connectors to the fuse array. When a fuse is installed in a fuse holder, the circuit is completed to the output connectors. When a fuse fails, the input power bus is connected through the GMT fuse conducting flag to the fuse failure alarm relay, which causes switch closures at the alarm contacts connection. The alarm condition is reported both on the front console (LED) and on the alarm output dry contacts (audio, visual, and remote) located on the rear of the panel except for total front access panel.

All GMT panels also provide an alarm reporting function, which indicates when normal function is interrupted due to lack of power or a failed fuse.

The alarm circuitry consists of alarm relays with form C contacts that are terminated at a connector or wire-wrap pin block on the outside of the fuse panel. During normal operation, the normally open (NO) contacts remain open and the normally closed (NC) contacts remain closed. When a fuse fails, the NO contacts close, creating a connection from NO to common (C) and the NC contacts open. In panels with a power on indicator, lack of power creates the same condition. The alarm contact closures may be used as loop closures in alarm systems. The current for each fuse failure alarm relay (set of three contacts) is 1.0 Amp maximum.

1.4 Specifications and Dimensions

Table 1 lists specifications for the Traditional GMT Series Fuse Panel.

Table 1. Traditional GMT Panel Specifications

PARAMETER	SPECIFICATION	REMARKS
Standards	Meets UL, Telcordia (Bellcore), NEC 1999, CSA, NEBS Level 3, IEC, and CE standards	
Physical		
Configuration options	Single bus (S) or dual bus (D); 10, 20, or 40 fuse positions (single bus); 10/10 or 20/20 fuse positions (dual bus); standard (front and rear) or total front access; 2-hole lug or set screw barrel power input; screw-down or set screw barrel power output; wire wrap or screw-down alarm terminations	For details refer to ADC catalog 1273819 available online at www.adc.com
Weight	Approximately 10 lbs. (4.5 Kg)	
Dimensions (HxWxD)	Standard access: 1.75 x 17.12 x 8.0 inches (4.44 x 43.28 x 20.32 cm). See Figure 9	Dimensions do not include depth of power connectors, alarm lamps, or fuses.
	Total front access: 3.5 x 21.25 x 4.0 inches (8.89 x 53.97 x 10.16 cm). See Figure 10	
Chassis material	Cold-rolled 16-gauge steel	Clear polycarbonate protective covers
Chassis color	Putty white or black powder coat	
Rack mount	19--inch (48.3 cm) or 23-inch (58.42 cm)	WEC0 or EIA hole spacing

Table 1. Traditional GMT Panel Specifications, continued

PARAMETER	SPECIFICATION	REMARKS
Recess options	Standard panels: flush or recessed 1 inch (2.54 cm), 2 inches (5.08 cm), 3 inches (7.62 cm), or 4 inches (10.16 cm); total front access panel: flush or recessed 1 inch (2.54 cm) or 2 inches (5.08 cm)	
Environmental		
Operating temperature	–5° C to +55° C	
Storage temperature	–45° C to +85° C	
Humidity range	0% to 95% humidity	No condensation
Altitude range	–197 ft. (60 m) to 13,000 ft. (3.96 km)	
Fire rating	All components UL94-V1 or better	
Earthquake design	Zone 4	
Acoustic noise	0 dBA above ambient	
Heat dissipation (fully loaded)	14 watts maximum @ 65 Amps 28 watts maximum @ 130 Amps	
Heat dissipation (no load)	1 watt per bus	
Electrical		
Operating voltages	±24 Vdc (±21 to ±30 Vdc tolerance) or ±48 Vdc (±42 to ±56 Vdc tolerance)	Panel automatically senses input voltage and adjusts as necessary
Input current	65 Amps (maximum) per bus	Dual bus: 130 Amps
Fuse type	GMT	0.2 to 15 Amp rating (see below)
Fuse mounting positions	Single bus: 10, 20, or 40; dual bus: 10/10 or 20/20	
Input power connection	2-hole compression lug (stud-type) or	Accepts wire up to #2 AWG
	screw-down barrel connector	Accepts wire up to #6 AWG
	0.25 inch holes on 0.625 inch centers	Panel ships with two 2-hole lugs (accepting 6 AWG) per bus
Output power connection Maximum fuse size and range of bare wire accepted* (S = single bus, D = dual) <i>*Output terminals accept a bare wire for termination in this wire size range. Warning: Size wire according to local practice and code, referring to Appendix A for ampacity guidelines.</i>	Screw-down barrier terminal strip or	Max lug width 0.20 inches (0.51 cm) # 12-22 AWG*
	set screw barrel terminal strip:	# 12-22 AWG*
	S10, D10 with screw-down output: 15 Amps	# 12-22 AWG*
	S10, D10 with set screw output: 15 Amps	# 12-24 AWG*
	S20 with screw-down output: 15 Amps	# 12-20 AWG*
	S20 with set screw output: 15 Amps	# 12-24 AWG*
	S40 with screw-down output: 10 Amps	# 16-24 AWG*
	S40 with set screw output: 15 Amps	# 12-24 AWG*
	D20 with screw-down output: 10 Amps	# 16-24 AWG*
	D20 with set screw output: 15 Amps	# 12-24 AWG*

Table 1. Traditional GMT Panel Specifications, continued

PARAMETER	SPECIFICATION	REMARKS
Alarm contact	Wire wrap or screw-down barrier terminal strip	
Alarm contact voltage	110 Vac, 125 Vdc maximum	
Alarm contact current	1 Amp maximum	
Grounding connections	Two #10 studs 0.25 inch holes on 0.625 inch centers	
Indicator LEDs	Power on: lights green when power is present	One LED per bus on most models; some models do not have this LED
	Fuse failure: Lights red when any fuse fails	One LED per bus on most models; some models have one LED for both buses together
Torque		
Mounting bracket chassis screws	15 pound-force inches	1.7 Newton meters
Mounting bracket rack screws	27 pound-force inches	3.1 Newton meters
Input power connections	Refer to installation drawing	
Output power connections	Refer to installation drawing	
Grounding stud nuts	23 pound-force inches	2.6 Newton meters

Figure 9 shows dimensions for the standard access panel. Figure 10 shows dimensions for the total front access panel.

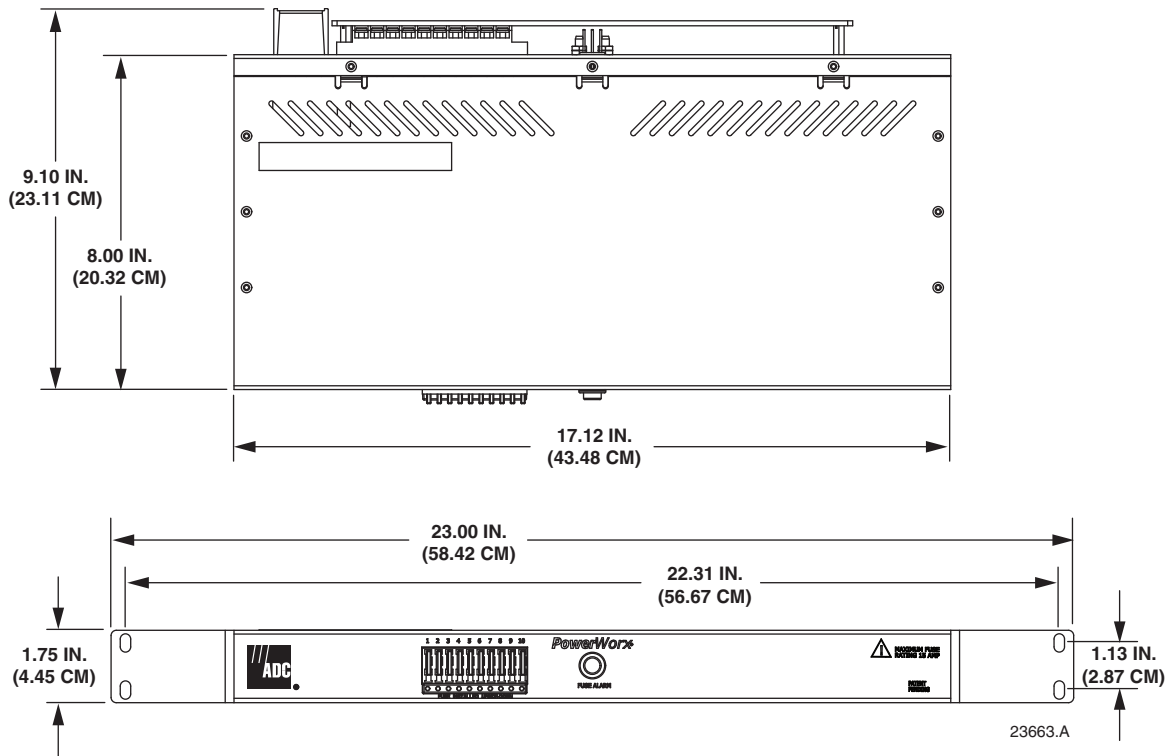


Figure 9. Standard Access Panel Dimensions

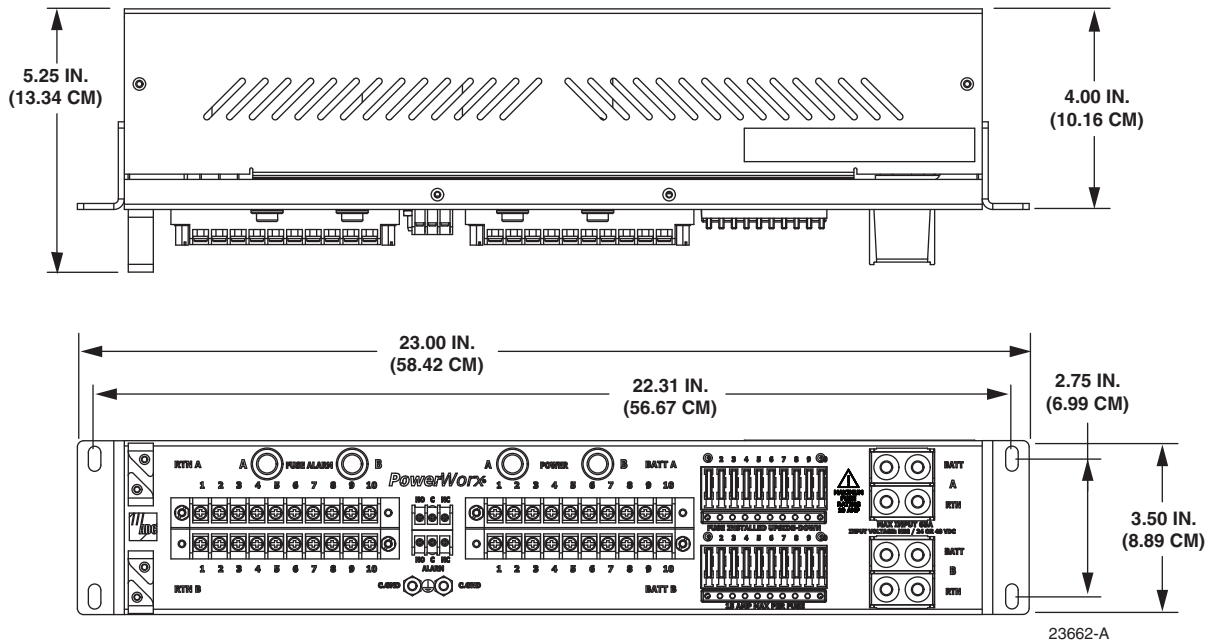


Figure 10. Total Front Access Panel Dimensions

1.5 Accessories

The following accessories are available for a GMT panel:

- GMT fuses. Standard fuse rating from 0.2 Amp to 15.0 Amps.
- Fuse designation pin holder.
- Colored, standard value, fuse designation pins.
- Cable management bar with mounting screws.
- GMT fuse puller.
- Compression lugs for #2, #4, #6, and #14 AWG wire.
- Fuse designation card holder kit.

2 UNPACKING

Unpack and inspect the various components as follows:

1. Inspect the exterior of the shipping container for evidence of handling that may have damaged the components in the container.
2. Unpack each container while carefully checking the contents for damage and verify with the packing slip.
3. File a claim with the commercial carrier and notify ADC Customer Service if damage is detected or if parts are missing. Save damaged cartons for inspection by the carrier.
4. For repair, replacement, and warranty information, refer to [Section 8 on page 30](#).

3 PRE-INSTALLATION TESTING

Each unit is thoroughly tested at the ADC Telecommunications factory. Before installation, an onsite resistance test is recommended, however, to assure that no damage has occurred during shipping or handling. If present, both bus A and bus B input circuits need to be tested.



Caution: *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with this equipment when the fuse panel is energized. Only insulated tools should be used on energized elements of the fuse panel.*



Caution: *Before performing this test, verify that the input and output power is not connected to the fuse panel connectors.*

To perform the resistance test, measure the resistance at each bus input with a multimeter connected to the BATT and RTN input terminals. You should obtain a reading of at least 500 ohms. (Some meters will indicate a resistance of several Megohms because their input voltage is not high enough to break down the forward conductance of the diodes used in the alarm circuit.) Any resistance higher than 500 ohms is acceptable.

4 INSTALLATION

Observe the following guidelines when installing the fuse panel:

- Mount the fuse panel in the uppermost area of the rack to reduce exposure of the power wiring. Allow at least 1.75 inches (4.45 cm) of air space (one rack space) on the top and bottom of the panel for cooling.
- If necessary, relocate any device that currently occupies the top space on the rack.
- Use common hand tools to install the fuse panel. You will find a power screwdriver helpful in installing the self-tapping screws that attach the mounting brackets to the rack.



Danger: *Never install telephone equipment in a wet location or during a lightning storm. When installing or modifying telephone lines, disconnect lines at the network interface before working with uninsulated lines or terminals to prevent electrical shock.*



Danger: *Do not install fuses in fuse panel or power source until you have completed the power wiring connections.*



Caution: *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with this equipment when the fuse panel is energized. Only insulated tools should be used on energized elements of the fuse panel.*

4.1 Installing the Cable Management Bar

The cable management bar is a product accessory not provided with the panel. If a cable management bar was ordered separately, mount the bar on the panel before installing the panel on the rack. Use the 1/4-inch (6.35 mm) long 4-40 screws supplied with the cable management bar. The cable management bar can be recess-mounted using the mounting holes closest to the front of the pane. Install the cable management bar as shown in Figure 11.

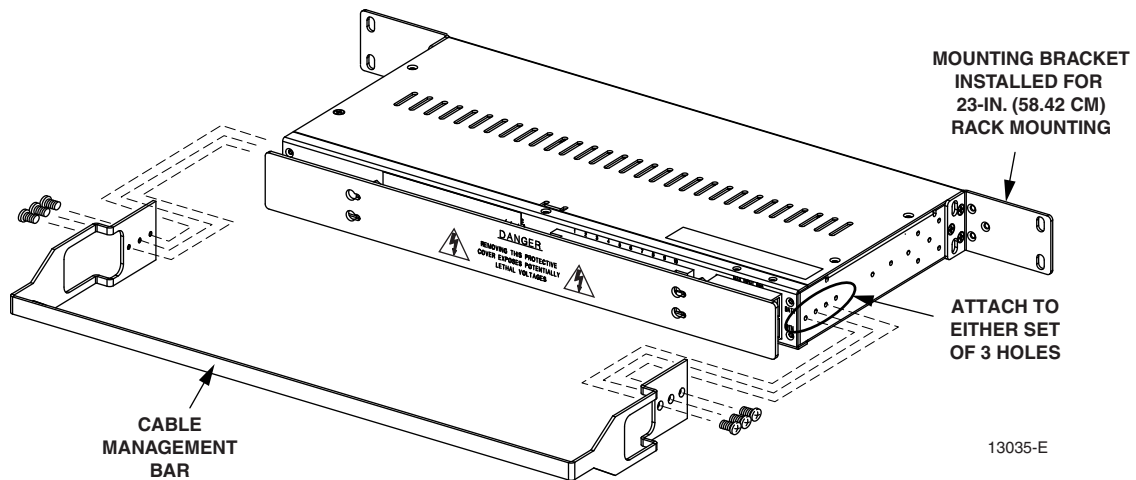


Figure 11. Installing the Cable Management Bar

4.2 Mounting the Panel on the Rack

The GMT panel can be mounted in either a 19-inch (48.26-cm) rack or a 23-inch (58.42-cm) rack, using WECC 1.00-inch (2.54 cm) or EIA 1.25-inch (3.18 cm) hole spacing. The standard (front and rear access) panels can be flush mounted or recessed 1 inch (2.54 cm), 2 inches (5.08 cm), 3 inches (7.62 cm), or 4 inches (10.16 cm). The total front access panel can be flush mounted or recessed 1 inch (2.54 cm) or 2 inches (5.08 cm).

Mounting brackets are provided with the panel. Some panels have universal mounting brackets that can be oriented in either of two ways to accommodate the different rack widths. Other panels have two different sets of mounting brackets, one set for each rack width. Hardware for mounting the brackets is also provided, as indicated in the following procedure in the figures showing rack mount positions.

► **Note:** ETSI rack mounting using ETSI mounting brackets is also available.

To install the panel, use the following procedure:

1. Determine rack width, rack type, and flush-versus-recess selection.

2. Locate the mounting brackets and determine whether they are the universal or specific rack width type. The universal brackets have a triangular pattern of holes as shown in [Figure 12](#).

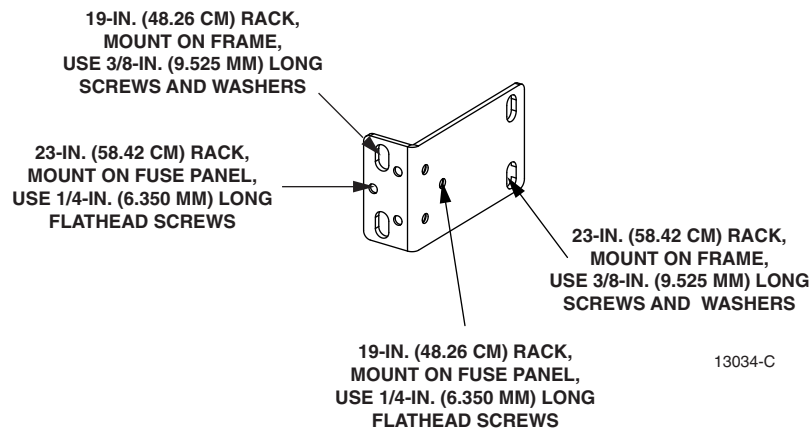


Figure 12. Universal Mounting Brackets

3. If the mounting bracket is the universal type, mount the bracket on the panel using the holes and hardware indicated in [Figure 12](#).
4. If the mounting brackets are the specific width type, select the 19-inch or 23-inch brackets, and orient and attach the mounting bracket on the panel referring to [Figure 13](#).

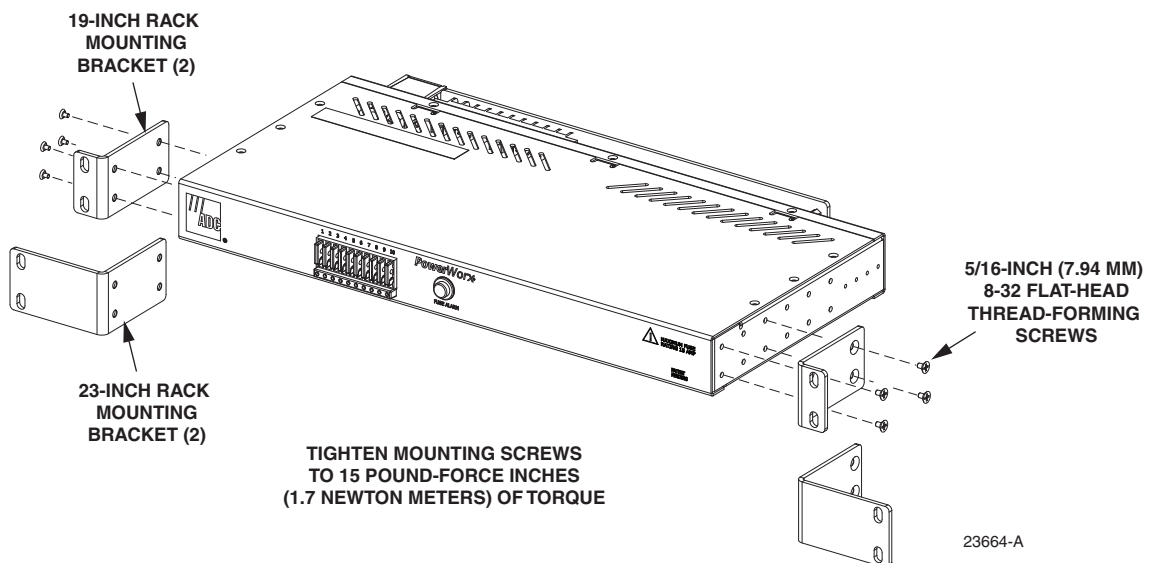


Figure 13. Selecting and Orienting Specific Width Brackets

5. Fasten the panel to the rack using the hardware provided, as shown in Figure 14. Tighten the screws to 27 pound-force inches (3.1 Newton-meters).

► **Note:** Figure 14 shows a single height (standard access) panel with a specific width mounting bracket. The panel being installed could be a double-height (total front access) panel. The mounting brackets could be either the specific width type or universal type.

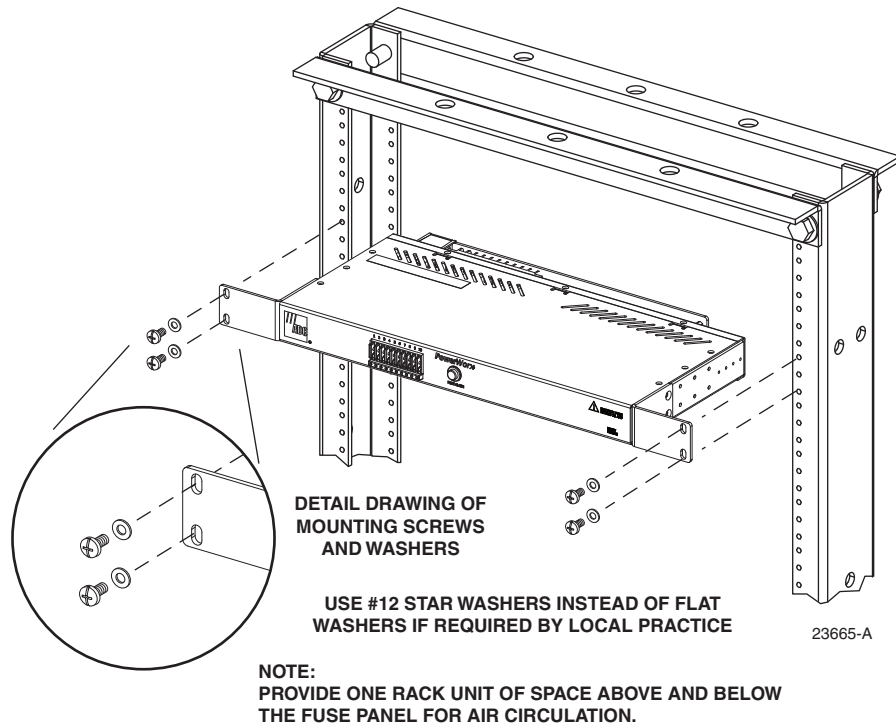


Figure 14. Mounting the Panel on the Rack

4.3 Connecting Grounding Cables

► **Note:** Use two #10 AWG wires if using both chassis ground connectors or one #6 AWG wire if using a dual hole compression lug. For ampacity guidelines if needed, refer to Appendix A in this manual. This procedure assumes use of two #10 AWG wires.

Use the following procedure to connect the fuse panel to an approved office ground source:

1. Obtain two lengths of 10 AWG wire for use as the chassis grounding wires.

2. Terminate one end of each wire with the #8 ring terminals provided (requires crimper).
3. Locate the C GND (chassis ground) studs at the rear of the fuse panel as shown in [Figure 15](#).
4. Connect the ring terminal end of each wire to one of the studs and secure using the nuts with captive star washers provided (requires 11/32-inch socket). Tighten the stud nut to 23 pound-force inches (2.6 Newton meters) of torque.
5. Terminate the opposite ends of the wires to an approved office ground.

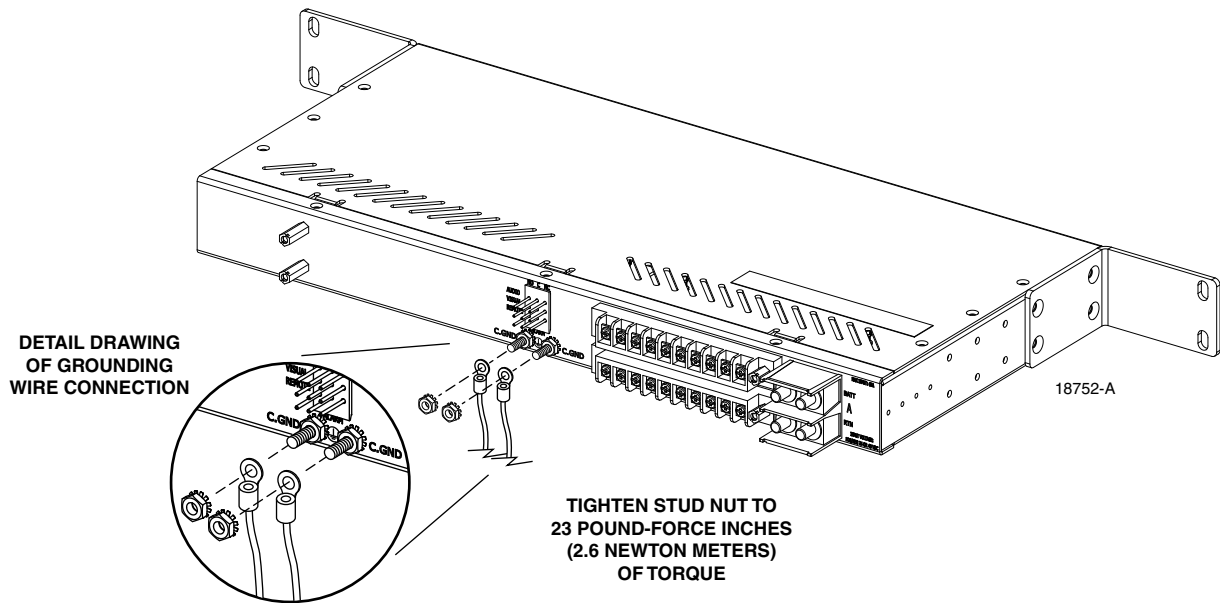


Figure 15. Chassis Grounding Connections

4.4 Connecting Alarms

The GMT panel provides external terminals for system use in detecting an alarm condition within the panel. These terminals are arranged into rows, with each row having three terminals labeled NO (Normally Open), C (Common), and NC (Normally Closed). Typically, there are three such rows for each bus labeled Audio, Visual, and Remote, and intended for that purpose in reporting the alarms to office personnel. The current for each fuse failure alarm relay (set of three contacts) is 1.0 Amp maximum.

An alarm is reported when any of the following situations occurs:

- Fuse failure (in either bus if the panel has dual buses).
- Power failure (only panels with “power on” green LED).

The alarm circuitry consists of fuse failure alarm relays with form C dry contacts that are terminated at the alarm terminals outside the panel. During normal operation, the normally open (NO) contacts remain open and the normally closed (NC) contacts remain closed. When a fuse fails (or when power is lost in a fuse panel with a power-on indicator), the NO contacts close, creating a connection from NO to C, and the NC contacts open.

The number and appearance of the alarm terminals will depend upon the type of alarm connector used in the panel being installed. Either of two types may be present:

- Wire wrap alarm terminals, shown in [Figure 16](#).
- Screw-down barrier strip alarm terminals, shown in [Figure 17](#).

Based on the type found, install the alarm cables referring to the following guidelines.

4.4.1 Wire Wrap Alarm Terminals

Use #22 to #26 AWG wire with the insulation stripped back. Refer to [Figure 16](#).

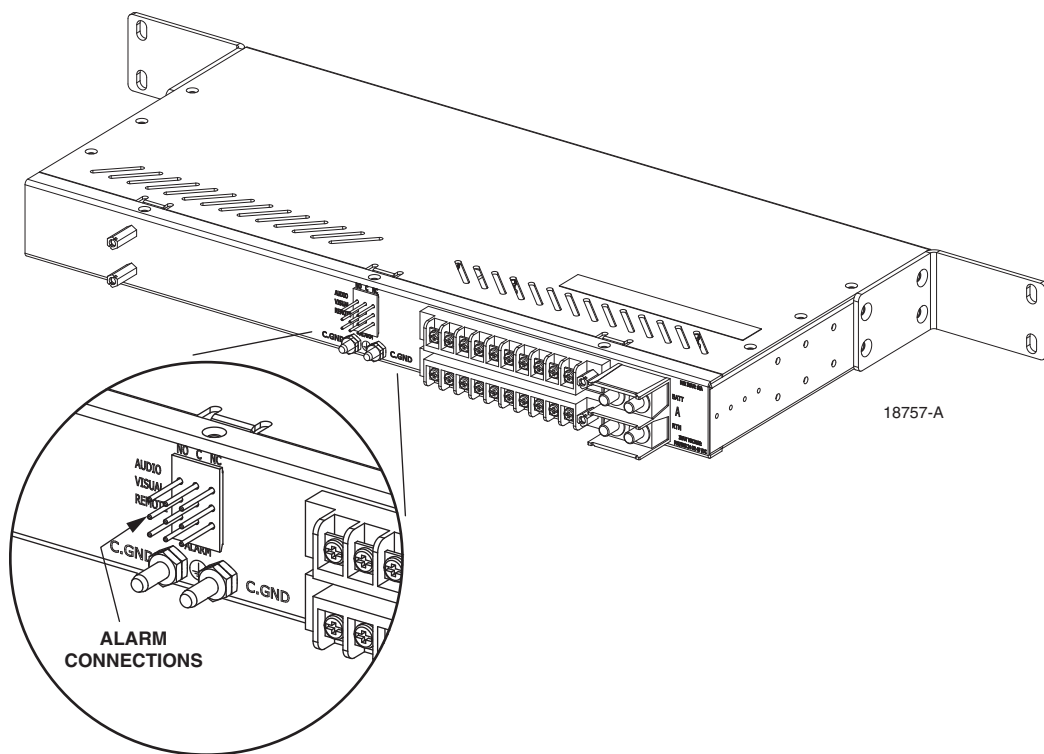


Figure 16. Wire Wrap Alarm Terminals

4.4.2 Screw-Down Barrier Strip Alarm Terminals

Use #12 to #24 AWG wire. Equip the wire leads with spade or crimp ring connectors having a maximum width of 0.375 inch (9.525 mm). The terminals also accommodate copper wire without lugs (with insulation stripped back). Use whichever method is dictated by local practice. Tighten the nuts to 9 pound-force inches (1 Newton-meters). Refer to [Figure 17](#).

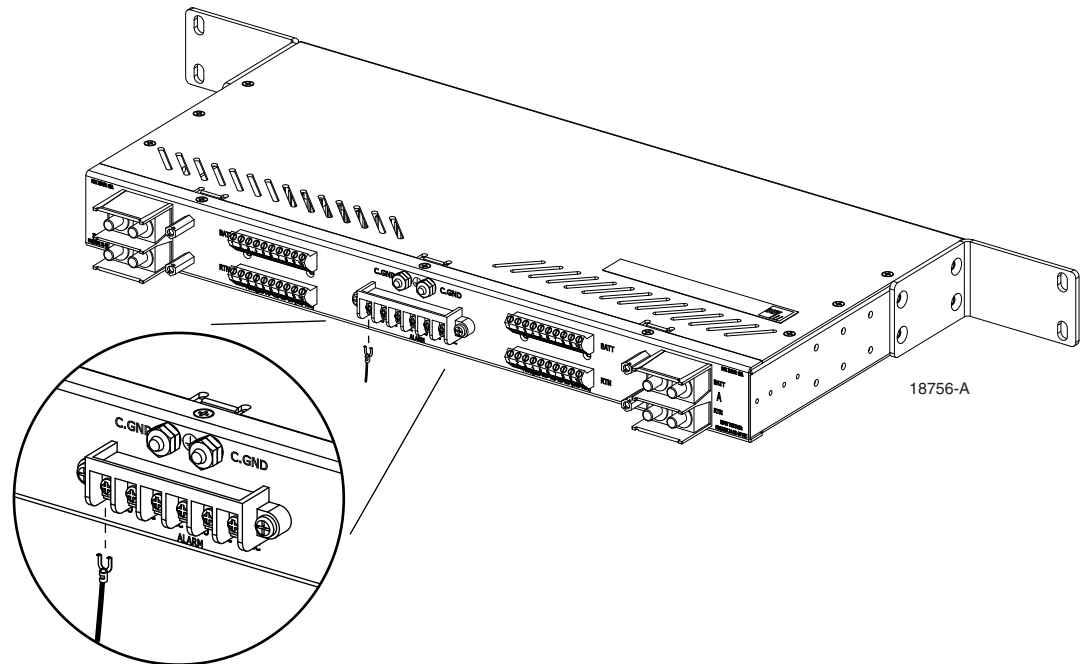


Figure 17. Screw-Down Barrier Strip Alarm Terminals

4.5 Connecting Power Input



Warning: Use of one bus only on a dual bus panel will result in false alarms for the unused bus. Power is required on both buses on a dual bus panel for normal operation.

The panel may have either of two types of input power connectors:

- Two-hole compression lugs, shown in [Figure 18](#).
- Set screw barrel connectors, shown in [Figure 19](#).

Based on the type found, refer to the appropriate topic below.



Caution: Connect only the input voltage wire (labeled *BATTERY* or *BATT*, or labeled with the voltage polarity and/or voltage value) to the connector on the fuse panel labeled *BATT* (battery). Connect only the input return wire (labeled *RTN*, *RETURN*, or *BATTERY GROUND*) to the connector on the fuse panel labeled *RTN* (return). If the wires are reversed, voltage could be present on the fuse panel chassis and current could flow through the unfused return wiring in the fuse panel. This condition causes damage to equipment in the frame in which the fuse panel is installed and to equipment in adjacent frames.

► **Note:** After installing the input wires, perform the connection polarity test described in [Subsection 4.5.3](#) on the following page. The purpose of this test is to verify that the wires have been connected to the correct leads.

4.5.1 Two-Hole Compression Lug

Each set of two studs can accept different size 2-hole lugs, which can be used with a range of wire sizes up to #2 AWG copper wire. In selecting wire size, follow local code, referring to the ampacity guidelines provided in Appendix A of this manual. Two 2-hole lugs for use with #6 AWG wire are included with the fuse panel for each bus. Install the input power wires to the studs as shown in [Figure 18](#). For torque specifications, refer to installation drawing.

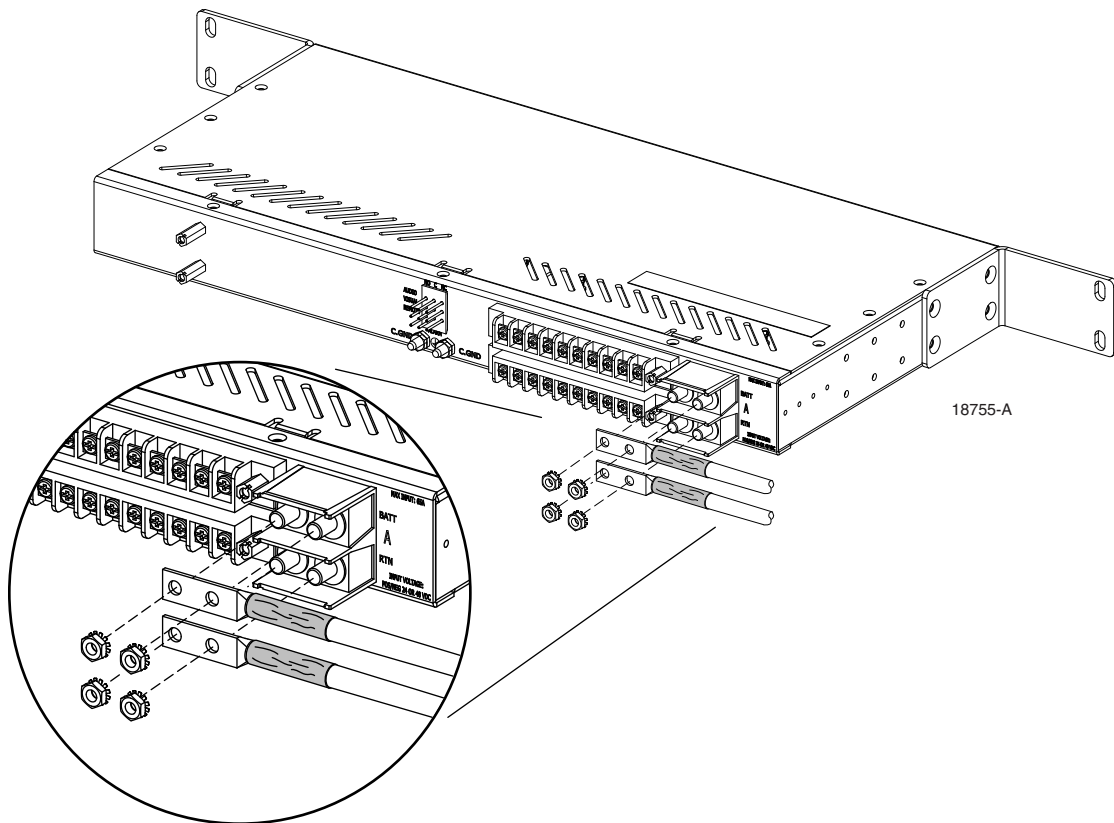


Figure 18. Installing Power Input Using 2-Hole Compression Lugs

4.5.2 Set Screw Barrel Connector

On each connector, the barrel that is closest to the outside of the fuse panel and does not have a cap on it is to be used to connect input power to the fuse panel power bus when installing the fuse panel. The other barrel on each connector that is closest to the center of the fuse panel has a cap over it and is not to be used or accessed. The set screw barrel input power connectors can accept up to a #6 AWG copper wire. In selecting wire size, follow local code, referring to the ampacity guidelines provided in Appendix A of this manual. The wire is inserted into the connector, and the connector screw is screwed down, compressing the wire. Install the input wires to the set screw barrel connectors as shown in Figure 19. For torque specifications, refer to installation drawing.

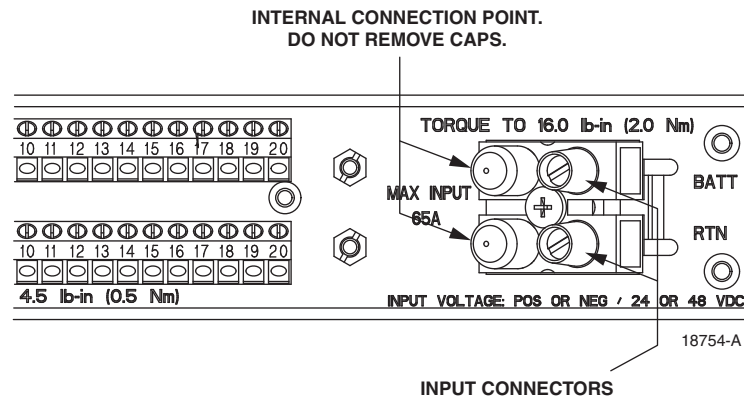


Figure 19. Installing Power Input Using Set Screw Barrel Connectors

4.5.3 Connection Polarity Test

After completing the input wiring, use the following procedure to verify that the power input wires are connected for correct polarity:

1. Verify that the input power cables are connected to the correct terminals.
2. Power up the fuse panel.
3. Using a multimeter set to measure DC voltage, measure the voltage between each input power (RTN) terminal and chassis ground. The voltage level should be less than 2.0 Vdc.
4. If the RTN voltage is much higher, and reads out in the ± 21 to ± 30 Vdc range for the ± 24 Vdc fuse panel or in the ± 42 to ± 56 Vdc range for the ± 48 Vdc fuse panel, the input leads are probably reversed. If this appears to be true, power down the panel. Disconnect the BATT and RTN input lugs and switch them around. Power up the panel and check again to verify that the higher voltage is on the BATT lug.
5. Power down the fuse panel if not already powered down.
6. If the problem is such that you can't figure it out with these instructions, consult with ADC Technical Assistance Center (TAC).

4.6 Installing Fuse Designation Card

Two types of fuse designation cards (shown in Figure 20) are provided with the fuse panel. Either type can be used depending on customer need. A card holder is also provided with the panel. The card holder has a pressure sensitive adhesive backing for attachment to the panel or rack in a customer-selected location.

To install the card holder, remove the paper cover on the adhesive backing and press the card holder on the panel or rack in the selected location. Select a fuse designation card, fill in the fuse designations, place the card in the card holder.

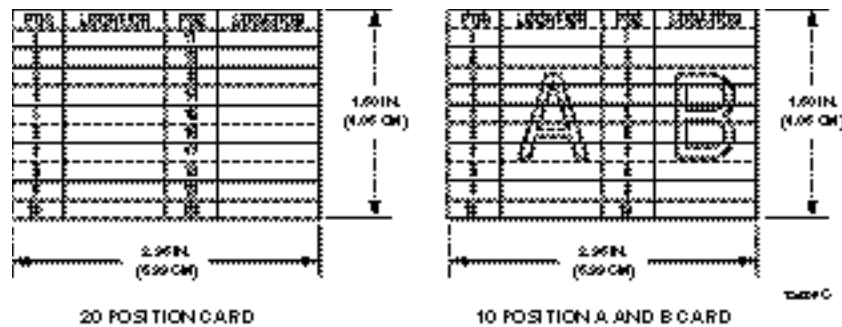


Figure 20. Fuse Designation Cards

4.7 Installing Fuse Designation Pin Holders

A designation pin holder for each power bus is provided with the panel. This holder is designed to hold color-coded pins that indicate fuse size. Designation pins are available from ADC as an accessory item. Figure 21 shows a designation pin holder. To install the designation pin holder, remove the paper cover on the adhesive backing and press the holder to the panel below the appropriate fuse holder, as shown in the figure.

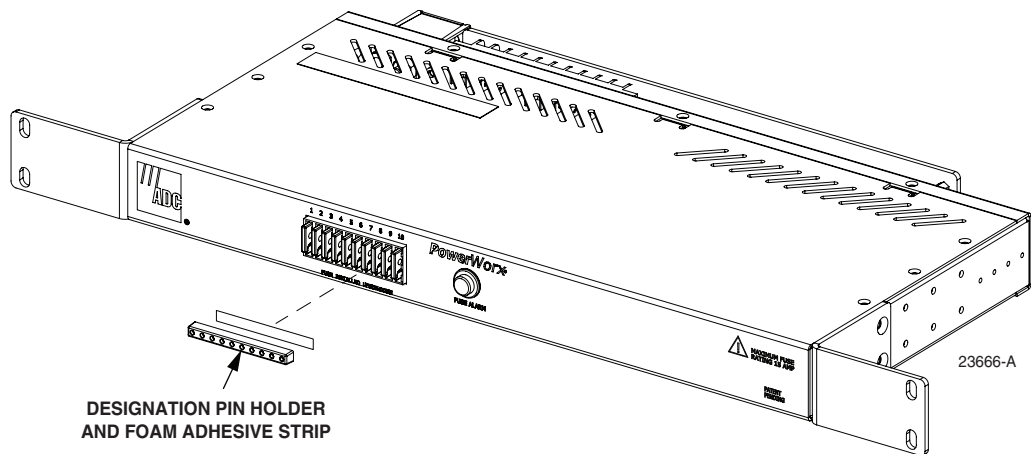


Figure 21. Installing Designation Pin Holders

4.8 Connecting Power Output

The panel may be equipped with either of two types of power output:

- Screw-down barrier terminal strip, shown in [Figure 22](#).
- Set-screw barrel terminal strip, shown in [Figure 23](#)

There will be two terminal strips per bus, labeled BATT and RTN. Based on the type of terminal strip, select from the following topics for guidelines on connecting power output.

4.8.1 Set Screw Barrel Terminal Strip

The set screw barrel terminal strip, shown in [Figure 22](#), accepts #12 to 22 AWG wire. In selecting wire size, follow local code, referring to the ampacity guidelines provided in Appendix A of this manual. For torque specifications, refer to the installation drawing provided with the fuse panel.

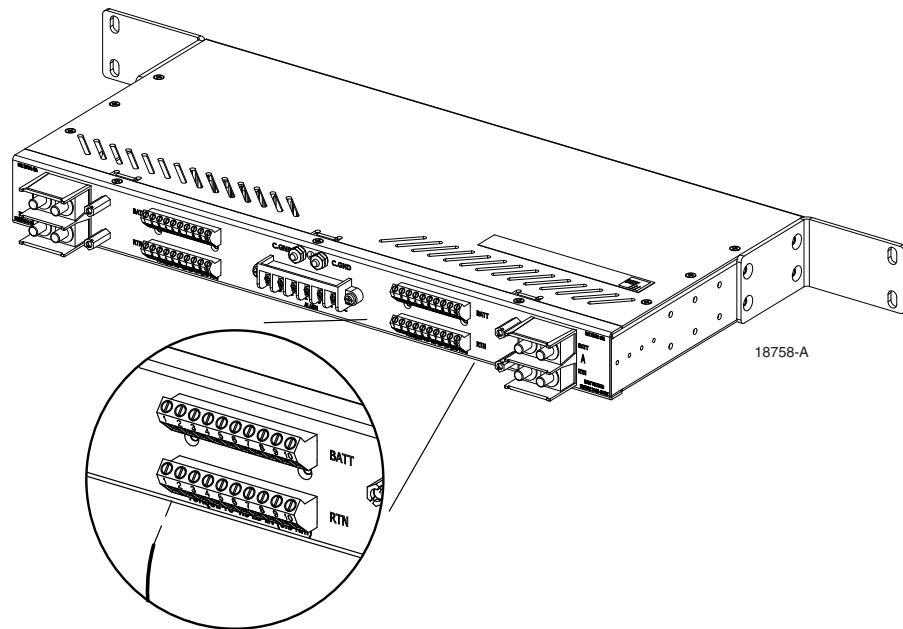


Figure 22. Set Screw Barrel Terminal Strip Power Output

4.8.2 Screw-Down Barrier Terminal Strip

The screw-down barrier terminal strip, shown in Figure 23, accepts #12 to 22 AWG wire. In selecting wire size, follow local code, referring to the ampacity guidelines provided in Appendix A of this manual. Equip wire leads with spade or crimp ring connectors that have a maximum width of 0.20 inches (0.51 cm). The terminals also accommodate copper wire without lugs (with insulation stripped back). Use whichever method is dictated by local practice. For torque specifications, refer to the installation drawing provided with the fuse panel.

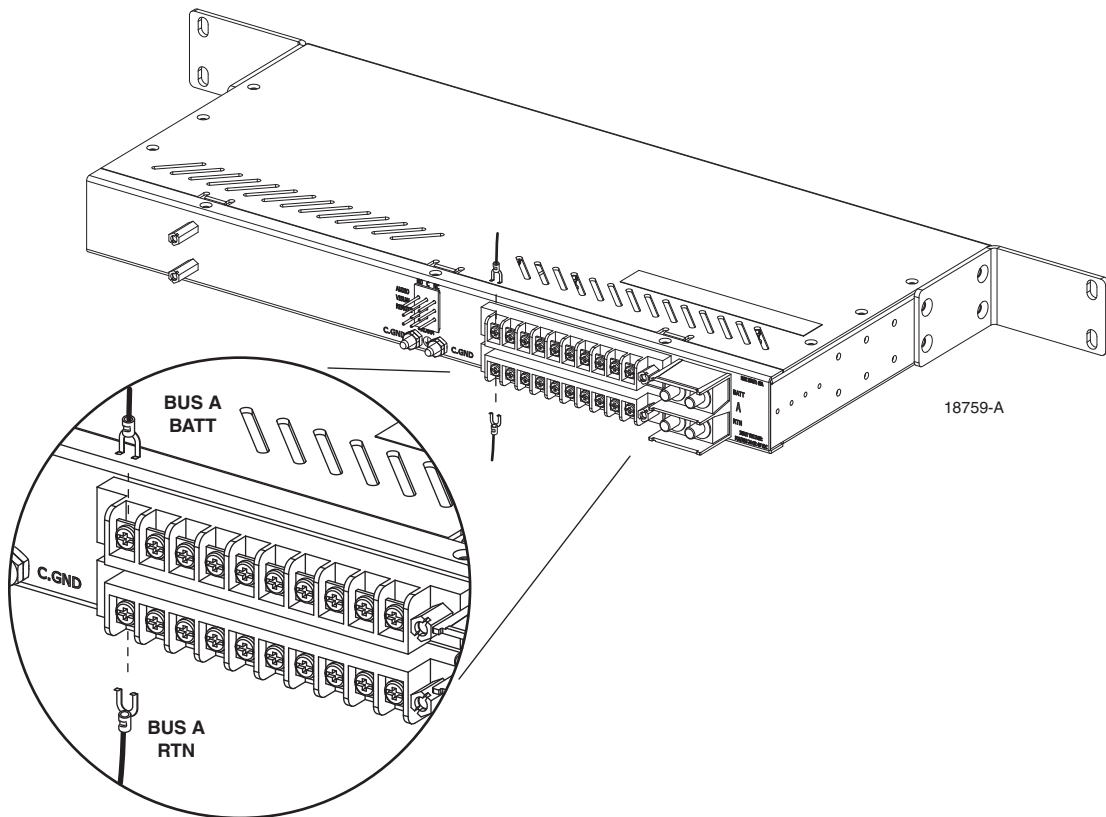


Figure 23. Screw-Down Barrier Strip Power Output

5 PRE-OPERATION TESTING

After installation and before placing the fuse panel into service, complete the following final tests.



Caution: *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with this equipment when the fuse panel is energized. Only insulated tools should be used on energized elements of the fuse panel.*

5.1 Wiring Connections Measurement

Measure the torque of all input, output, and fuse failure alarm relay contact connections using a torque screwdriver calibrated in force-pound inches (Newton-meters). For correct torque values, refer to [Table 1 on page 8](#) or the installation drawing provided with the fuse panel.

5.2 Fuse Alarm Relay Check

Power on the unit and check the fuse failure alarm contacts. The fuse failure alarm relay should indicate an open circuit between the common (C) contact and the normally open (NO) contact at the alarm contacts. When input power is not applied, a short should be indicated between these contacts and open circuit between the common (C) contact and the normally closed (NC) contact at the alarm contacts.

5.3 Fuse Alarm Indicator Test

Place a fuse that has failed in one of the fuse positions on each bus. The visual fuse alarm indicator(s) should change from unlighted to a red light, and the fuse failure alarm relay should report an alarm.

6 OPERATION



Caution: *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with this equipment when the fuse panel is energized. Only insulated tools should be used on energized elements of the fuse panel.*

Operation of the fuse panel consists of connecting new equipment when needed and removing and replacing failed fuses. If a fuse fails, the alarm indicator lights, and the external and remote alarms are activated (if present).

6.1 Connecting New Equipment

New fused equipment may be connected to unused output power circuits following installation and testing of the fuse panel. Use the following procedure for connecting the output power wires for new fused equipment to a previously installed fuse panel:



Warning: *The fuse panel uses electrical voltage and current levels that may be considered an electrical hazard per GR-1089. Only qualified personnel should be allowed to install, operate, maintain, or otherwise come into contact with this equipment when energized. Only insulated tools should be used on energized elements of the panel.*

1. Remove the plastic protective cover from the output power terminal.
2. Locate an unused pair of terminals on the output terminal block and verify that a fuse is not installed the corresponding fuse position.
3. Connect the output power wiring to the fuse panel output terminals as described in [subsection 4.8 on page 23](#).



Warning: *Use care to avoid shorting out adjacent terminals when connecting new output power wiring to a powered fuse panel. Shorting may cause injury and damage the fuse panel or the connected fused equipment.*

4. Install the plastic protective cover over the input and output power terminal blocks.
5. Install a fuse of the recommended size (as specified by the fused equipment manufacturer) in the appropriate fuse position (see next topic).

6.2 Installing or Replacing a Fuse

Install a GMT fuse of the recommended size and type (as specified by the fused equipment manufacturer) in each fuse position.

The current rating of the fuse (in Amperes) is indicated on the side of the fuse. The color of the indicator also corresponds to the fuse size. Refer to the color code chart provided with replacement fuses to identify the fuse size by color.



Caution: *Using the wrong fuse may cause damage to the protected equipment or the fuse panel. When replacing a blown fuse, make sure the replacement fuse is the same type and has exactly the same current rating as the fuse being replaced and does not exceed 15 Amps rating (10 Amps rating for panels with a maximum fuse rating of 10 Amps).*

The fuse manufacturer recommends that GMT fuses rated 8 to 15 Amps be continuously operated at no more than 80% of their nominal current rating.

Table 2 indicates the nominal rating and continuous operation rating for the affected GMT fuses.

Table 2. GMT Fuse Ratings

NOMINAL RATING	CONTINUOUS OPERATION RATING
GMT-10 Amp	8 Amps
GMT-12 Amp	9.6 Amps
GMT-15 Amp	12 Amps

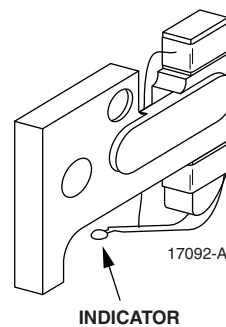


Figure 24. GMT Fuse

Remove the dummy fuses from the fuse positions that will supply power to the equipment. Orient each fuse so the indicator is on the bottom as shown in illustration above. Insert the fuse into the appropriate fuse position in the GMT fuse holder.

When a fuse fails, the fuse alarm LED indicator will light (red). The indicator on the failed fuse will spring outward and should be visible on the bottom side of the fuse. Use a GMT fuse puller to remove the failed fuse from the fuse panel. The fuse alarm LED indicator should go out. Determine the problem that caused the fuse to fail and take the appropriate corrective action. When the problem has been corrected, install a replacement GMT fuse.

Make sure the fuse-type and current rating of the replacement fuse complies with any recommendations provided by the manufacturer of the connected equipment and does not exceed 15 Amps rating (10 Amps rating for panels with a maximum fuse rating of 10 Amps).

6.3 Maximum Bus Loading Condition

The maximum continuous load condition for the Traditional GMT Series Panels is shown below for panels with 15 Amp rated fuse holders in [Table 3](#) and for panels with 10 Amp rated fuse holders in [Table 4](#).

**Table 3. Panels With 15 Amp Rated Fuse Holder
(Maximum Bus Load Condition, Maximum Continuous Load)**

FUSE POSITION	CONTINUOUS AMPS
1	12
2	12
3	12
4	12
5	12
6	5
7*	0
8*	0
Total	65

* No fuse in position 7 or higher.

**Table 4. Panels With 10 Amp Rated Fuse Holder
(Maximum Bus Load Condition, Maximum Continuous Load)**

FUSE POSITION	CONTINUOUS AMPS
1	8
2	8
3	8
4	8
5	8
6	8
7	8
8	8
9	1
10*	0
Total	65

* No fuse in position 10 or higher.

7 MAINTENANCE



Caution: *This equipment employs electrical voltage and amperage levels which may be considered an electrical hazard. Care should be exercised to assure that only qualified personnel are allowed to install, operate, maintain, or otherwise come in contact with this equipment when the fuse panel is energized. Only insulated tools should be used on energized elements of the fuse panel.*

Maintenance consists of inspecting the fuse panel and cleaning it when needed.

7.1 Inspection

Inspect the fuse panel periodically (every six months is recommended) for damage to the fuses and for damaged or broken wires on the power outputs and external alarm connections. Inspect for excessive dust and dirt that block the vents.

7.2 Cleaning

If excessive dirt is found during the inspection, brush or wipe the dust and dirt from the fuse panel with a soft bristle brush or soft cloth. Take care not to damage the fuses or any wiring.

7.3 Adjustments

No adjustments in the field are indicated or required. If a circuit is not operating properly, contact ADC customer assistance (see [Section 8 on page 30](#)).

8 CUSTOMER INFORMATION AND ASSISTANCE



PHONE:

U.S.A. or CANADA

Sales: 1-800-366-3891
 Extension 73000
 Technical Assistance: 1-800-366-3891
 Connectivity Extension: 73475
 Wireless Extension: 73476

EUROPE

Sales Administration: +32-2-712-65 00
 Technical Assistance: +32-2-712-65 42

EUROPEAN TOLL FREE NUMBERS

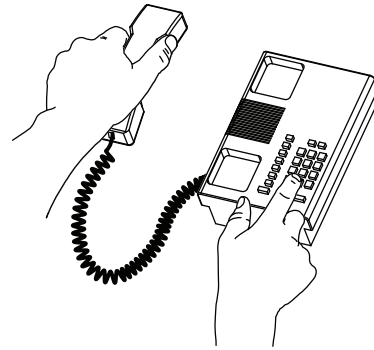
Germany: 0180 2232923
 UK: 0800 960236
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 Italy: 0800 782374

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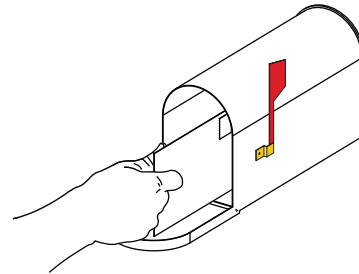
13944-Q

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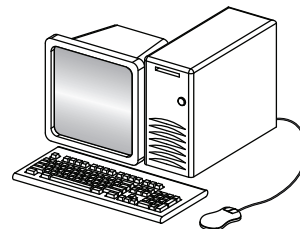
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APPENDIX A: ALLOWABLE AMPACITIES OF INSULATED CONDUCTORS

This appendix provides guidelines for selecting AWG wire size based on the temperature rating of the conductor and the anticipated load. The information contained is from Table 310-16 of the National Electrical Code document, ANSI/NPFA 70 (1978).

► **Note:** Information for aluminum conductors has been omitted from the table here because copper conductors only are recommended for use with the ADC panel.

Table 310-16 (NEC): Allowable Ampacities of Insulated Conductors, Rated 0 Through 2000 Volts, 60° to 90°C (140° to 194°F), Not More Than Three Current-Carrying Conductors in Raceway or Cable or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)

SIZE AWG KCMIL	TEMPERATURE RATING OF CONDUCTOR		
	60°C (114°F)	60°C (114°F)	60°C (114°F)
	TYPES TW*, UF*	TYPES FEPW*, RH*, RHW*, THHW*, THW*, THWN*, XHHW*, USE*, ZW*	TYPES TBS, SA, SIS, FEP*, FEPB*, MI, RHH*, RHW-2, THHN*, THHW*, THW-2*, THWN-2*, USE-2, XHH, XHHW*, XHHW-2 ZW-2
18	....	....	14
16	....	....	18
14	20*	20*	25*
12	25*	25*	30*
10	30	35*	40*
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	110
2	95	115	130
1	110	130	150
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250	215	255	290
300	240	285	320
350	260	310	350
400	280	335	380

Table 310-16 (NEC): Allowable Ampacities of Insulated Conductors, Rated 0 Through 2000 Volts, 60° to 90°C (140° to 194°F), Not More Than Three Current-Carrying Conductors in Raceway or Cable or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)

SIZE AWG KCMIL	TEMPERATURE RATING OF CONDUCTOR		
	60°C (114°F)	60°C (114°F)	60°C (114°F)
	TYPES TW*, UF*	TYPES FEPW*, RH*, RHW*, THHW*, THW*, THWN*, XHHW*, USE*, ZW*	TYPES TBS, SA, SIS, FEP*, FEPB*, MI, RHH*, RHW-2, THHN*, THHW*, THW-2*, THWN-2*, USE-2, XHH, XHHW*, XHHW-2 ZW-2
500	320	380	430
600	355	420	475
700	385	460	520
750	400	335	380
800	410	490	555
900	435	520	585
1000	455	545	615
1250	495	590	665
1500	520	625	705
1750	545	650	735
2000	560	665	750
CORRECTION FACTORS			
For ambient temperatures other than 30C (86F), multiply the allowable ampacities shown by the appropriate factor shown below.			
21-25	1.08	1.05	1.04
26-30	1.00	1.00	1.00
31-35	.91	.94	.96
36-40	.82	.88	.91
41-45	.71	.82	.87
46-50	.58	.75	.82
51-55	.41	.67	.76
56-60	....	.58	.71
61-70	....	.33	.58
71-80	....	....	.41

* Unless otherwise specifically permitted in the code, as defined in the NEC document cited (ANSI/NEC 70), the overcurrent protection for conductor types marked with an asterisk (*) shall not exceed 15 amperes for No. 14, 20 amperes for No. 12, and 30 amperes for No. 10 copper, after any correction factors for ambient temperature and number of conductors have been applied.



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